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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,721	12/27/2001	Yukiko Kubota	010951	6364

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EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 03/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,721

Applicant(s)

KUBOTA ET AL.

Examiner

Kevin M Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8 and 11-14 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 9, 10, 12 and 14-19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1, 5, 6, 12 and 14 - 16, filed on December 17, 2003, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Examiner's Comments

3. The limitation "graded" has been re-interpreted based on applicants' arguments. Specifically, the Examiner has given the term the broader definition argued by applicants, specifically that it merely refers to a layer having "steps or degrees" and is not limited to layers which do not exchange link adjacent grains. The Examiner notes that since the prior rejection utilized a narrower interpretation that the claims reading on the narrower interpretation would necessarily still read on the broader definition. Since the previously applied art is being maintained, this rejection has been made FINAL since the basis of the rejections have not changed despite the new definition assigned to the term "graded".

Claim Objections

4. Claims 5 and 6 are objected to because of the following informalities: the “4” from the old dependency has not been deleted, i.e. the claims presently read “... as recited in claim 1 4, wherein ...”. Appropriate correction is required.

5. Claim 14 is objected to because of the following informalities: the phrase “a graded magnetic recording material *including alternating layers* of an initial paramagnetic Cobalt alloy and a perpendicular recording material having a noble metal” can be read that the recording layer comprises alternating layers of (i) paramagnetic Cobalt alloy and a (ii) perpendicular recording material having a noble metal, which is not enabled by the as-filed disclosure. However, based upon applicants’ as-filed disclosure (esp. claim 15), the Examiner notes that the present claim has been interpreted as reciting: “a graded magnetic recording material including alternating layers of a Cobalt alloy and a noble metal, wherein the graded magnetic recording material further comprises an initial paramagnetic material and a final perpendicular recording material” (see claim 15). Appropriate correction is required.

6. Claims 5, 9, 10 and 15 – 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 14 recites alternating layers of (i) "an initial paramagnetic Cobalt alloy" and (ii) "a perpendicular recording material having a noble metal", which is not supported by the as-filed disclosure. For purposes of evaluating the prior art, the Examiner has interpreted this claim as described above in Paragraph 5.

Claim Rejections - 35 USC § 103

9. Claims 1 – 3, 6 – 8, 11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (U.S. Patent No. 5,750,270) in view of Suzuki et al. (U.S. Patent No. 5,587,235) and Soeya et al. (U.S. Patent No. 5,726,838).

Regarding claims 1 – 3, 11 and 13, Tang et al. disclose a magnetic recording medium having a substrate (*Figure 1, layer 30*) a magnetic layer (i.e. applicants' "interlayer") (*layer 31 and col. 9, lines 9 - 21*), and a layer of magnetic recording material thereon, the magnetic recording material comprising a plurality of bilayers having Cobalt

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or a Cobalt alloy according to claim 11 and a noble metal, such as Pt or Pd (*layers 34 and 35 and col. 9, line 44 bridging col. 10, line 15*).

Tang et al. fail to disclose an initial paramagnetic layer between the soft magnetic layer and the plurality of bilayers of Cobalt and a noble metal.

However, Suzuki et al. teach that it is known in the art that providing a paramagnetic intermediate layer between two adjacent magnetic layers, it is possible to reduce the medium noise during recording/reproducing operations (*col. 2, lines 18 - 22; col. 2, line 53 bridging col. 3, line 38; col. 3, line 60 bridging col. 4, line 9*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tang et al. to include a paramagnetic intermediate layer (i.e. applicants' "initial paramagnetic layer") between the two adjacent magnetic layers (*Tang et al., layer 31 and {layers 34/34}_n*) as taught by Suzuki et al. since such a paramagnetic intermediate layer makes it possible to reduce the medium noise during recording/reproducing operations.

The limitation "does not exchange link adjacent grains" is deemed to be necessarily present in the prior art intermediate layer since the prior art intermediate layer is substantially identical in composition and/or structure (*see Paragraph 9 of the Office Action mailed September 4, 2003*). The Examiner's sound basis for this assertion is that both the claimed and prior art layers are paramagnetic, and the Examiner notes that exchange coupling forces are *only associated with adjacent ferro/ferri-magnetic grains/materials*, not paramagnetic or non-magnetic grains/materials (*see Soeya et al., col. 13, lines 3 - 7 and col. 16, lines 31 - 37*). Since the layer is

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paramagnetic and not ferro/ferri-magnetic, the layer would not possess exchange linking/coupling forces between adjacent grains or layers.

Regarding claims 6 - 8, Tang et al. disclose Co and noble metal bilayers meeting applicants' claimed thickness and lamination number limitations (*col. 9, line 64 bridging col. 10, line 24 and Examples*).

Regarding claim 14, Suzuki et al. teach using an initial paramagnetic Cobalt alloy for the paramagnetic layer (*col. 2, lines 61 – 65*).

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. in view of Suzuki et al. and Soeya et al. as applied above, and further in view of Takano et al. (*J. App. Phys.*, 87(9), 2000, 6364 – 6366).

Tang et al., Suzuki et al. and Soeya et al. are relied upon as described above.

None of the above disclose a CoCr₄₀ alloy.

However, Takano et al. teach that the amount of chromium in a {CoCr/Pt}_n multilayer can be varied from 0 to 60% to effect the Kerr rotation angle and magnetic properties (*Figure 3 and Section III*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to determine an amount of Cr in a CoCr alloy meeting applicants' claimed composition limitation by optimizing the results effective variable through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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11. Claims 1 – 3, 6 – 8, 11, 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Ikeda et al. (U.S. Patent No. 6,468,670 B1) in view of Suzuki et al. ('235) and Soeya et al. ('838).

Regarding claims 1 – 3, 11 and 13, Ikeda et al. disclose a magnetic recording medium having a substrate (*Figure 1, "Substrate"*) a magnetic layer (i.e. applicants' "interlayer") ("*CoCr Granular Layer*" and *col. 2, lines 7 - 15*), and a layer of magnetic recording material thereon, the magnetic recording material comprising a plurality of bilayers having Cobalt or a Cobalt alloy according to claim 11 and a noble metal, such as Pt or Pd ("*Co/Pt Multilayer*"; *col. 3, lines 17 – 20; and col. 5, lines 17 - 20*).

Ikeda et al. fail to disclose an initial paramagnetic layer between the soft magnetic layer and the plurality of bilayers of Cobalt and a noble metal.

However, Suzuki et al. teach that it is known in the art that providing a paramagnetic intermediate layer between two adjacent magnetic layers, it is possible to reduce the medium noise during recording/reproducing operations (*col. 2, lines 18 - 22; col. 2, line 53 bridging col. 3, line 38; col. 3, line 60 bridging col. 4, line 9*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Ikeda et al. to include a paramagnetic intermediate layer (i.e. applicants' "initial paramagnetic layer") between the two adjacent magnetic layers (*Ikeda et al., "CoCr Granular Layer" and "Co/Pt Multilayer"*) as taught by Suzuki et al. since such a paramagnetic intermediate layer makes it possible to reduce the medium noise during recording/reproducing operations.

The limitation "does not exchange link adjacent grains" is deemed to be necessarily present in the prior art intermediate layer since the prior art intermediate layer is substantially identical in composition and/or structure (see *Paragraph 11 of the Office Action mailed September 4, 2003*). The Examiner's sound basis for this assertion is that both the claimed and prior art layers are paramagnetic, and the Examiner notes that exchange coupling forces are *only associated with adjacent ferro/ferri-magnetic grains/materials*, not paramagnetic or non-magnetic grains/materials (see *Soeya et al., col. 13, lines 3 – 7 and col. 16, lines 31 – 37*). Since the layer is paramagnetic and not ferro/ferri-magnetic, the layer would not possess exchange linking/coupling forces between adjacent grains or layers.

Regarding claims 6 and 7, Ikeda et al. disclose Co and noble metal bilayers meeting applicants' claimed thickness and lamination number limitations (*col. 3, lines 63 - 67*).

Regarding claim 8, the number of laminations is a known results effective variable in terms of the overall magnetic properties (*Ikeda et al., col. 3, lines 63 – 67: medium A, n = 10 and medium B, n = 16; and Figures 2 and 3*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the number of laminations through routine experimentation, especially given the teaching in Ikeda et al. regarding the effect of using 10 and 16 laminations on the magnetic properties of the medium.

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Regarding claim 14, Suzuki et al. teach using an initial paramagnetic Cobalt alloy for the paramagnetic layer (*col. 2, lines 61 – 65*).

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. in view of Suzuki et al. ('235) and Soeya et al. ('838) as applied above, and further in view of Takano et al. (J. App. Phys., 87(9), 2000, 6364 – 6366).

Ikeda et al., Suzuki et al. and Soeya et al. are relied upon as described above.

None of the above disclose a CoCr_{40} alloy.

However, Takano et al. teach that the amount of chromium in a $\{\text{CoCr/Pt}\}_n$ multilayer can be varied from 0 to 60% to effect the Kerr rotation angle and magnetic properties (*Figure 3 and Section III*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to determine an amount of Cr in a CoCr alloy meeting applicants' claimed composition limitation by optimizing the results effective variable through routine experimentation.

Allowable Subject Matter

13. The following is a statement of reasons for the indication of allowable subject matter: claims 5, 9, 10 and 15 – 19 recite the limitation "wherein the initial paramagnetic layer comprises a Cobalt alloy having a thickness of about 0.9 \AA ", which is neither taught, nor rendered obvious, by the prior art of record. While the prior art of record teaches using a paramagnetic layer between two magnetic layers for a reduction in

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medium noise, the prior art of record fails to teach or render obvious a paramagnetic layer possessing the claimed thickness limitation.

Response to Arguments

14. The rejection of claims 1 – 3, 6 – 8 and 11 - 14 under 35 U.S.C § 103(a) – Tang et al. in view of various references

The rejection of claims 1 – 3, 6 – 8 and 11 - 14 under 35 U.S.C § 103(a) – Ikeda et al. in view of various references

Applicant(s) argue(s) that the paramagnetic layer is “conventionally referred to as non-magnetic” and that “the magnetic anisotropy energy, K_u , of the Cobalt alloy granular seedlayer of the present invention is zero” (*page 5 of response*). Applicants further argue that “Suzuki et al. teaches away from the present invention wherein the ferro-magnetic layer has anisotropy energy of zero” (*page 6 of response*). The examiner respectfully disagrees.

While applicants’ arguments have been considered, the Examiner notes that applicants have presented no evidence that a paramagnetic layer must necessarily possess a K_u of zero. Furthermore, the Examiner notes that one of ordinary skill in the art would not use “paramagnetic” and “non-magnetic” as interchangeable since the behavior of a paramagnetic material is different from a non-magnetic material. Applicants are invited to present evidence that one of ordinary skill would use such terms interchangeably despite the difference in behavior typically seen for such materials.

The Examiner also notes that the limitation "an anisotropy energy of zero" is not presently claimed, therefore arguments directed to such a limitation as distinguishing from the prior art is not persuasive. While applicants point to Paragraph 20 for support of a K_u of zero, the Examiner notes that Paragraph 20 of the as-filed disclosure merely states that there is no magnetic coupling between neighboring grains of the Cobalt alloy. This, however, can be achieved simply by tailoring the amount of non-magnetic material in the alloy (i.e. the boron in the disclosed CoB/Pd lattices), since the non-magnetic material can be made to form between the Co magnetic grains, thereby isolating them from each other. As such, the Examiner does not find applicants' arguments convincing that a paramagnetic layer necessarily possesses a K_u of zero.

Finally, the Examiner notes that there is no evidence that Suzuki et al. does not encompass paramagnetic layers as disclosed by applicants. While applicants allege that the Suzuki et al. "mainly paramagnetic layers" are different, the Examiner notes that Suzuki et al. discloses explicitly that paramagnetic layers possessing *no* magnetism can be used in the disclosed invention (*col. 4, lines 29 – 38 and lines 59 – 64*). As such, the Examiner does not find applicants' arguments persuasive.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Applicants' amendment resulted in embodiments not previously considered (e.g. the combination of the limitation "an initial paramagnetic layer and a final recording layer" with "wherein the noble metal is palladium or platinum (claims 2 and 3)) which necessitated the new grounds of rejection, and hence the finality of this action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

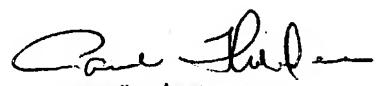
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (571) 272-1516. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KMB
March 19, 2004



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